



PBDE MONITORING IN PUGET SOUND

Conference line for Sept 17th:

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September 17, 2013

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Today's Agenda

10 – 10:10

Introduction

10:10 – 10:30

Goals for the Workgroup

10:30 – 11:25

Existing PBDE Monitoring Efforts in Puget Sound

-5 minute break-

11:30 am – 11:55

PBDE Monitoring in the Great Lakes

(Elizabeth Murphy, EPA Great Lakes National Program Office)

11:55 am – noon

Wrap Up

Next Meetings:

- ☐ *Wednesday, October 16th 10-noon*
- ☐ *Wednesday, November 13th 10-noon*

How We Got Here

- ESA consultation for Joint Base Lewis McChord Solo Point Wastewater Treatment Plant NPDES permit
- Concern re: PBDEs in Southern Resident Killer Whales (& resident Chinook salmon)
- Conservation Measures
 - Technical Workgroups
 - PBDE monitoring & removal effectiveness from WWTPs
 - Modeling of fate, transport, & bioaccumulation
 - PBDE toxicological threshold levels in marine mammals and threshold levels for mixtures containing PBDEs and other persistent pollutants
 - Policy Forum – June 6th, 2013



Behavior of PBDEs in the Environment

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- PBDEs used as flame retardants since the 1970s
 - ▣ Textiles, plastics, wire insulation, and automobiles
- PBDEs are a complex mixture of 209 congeners
 - ▣ Vary by the number of bromine atoms and location of the molecule
- Certain PBDE congeners are persistent, bioaccumulative, and toxic to both humans and the environment (focus on BDE-47, BDE-99, BDE 209?)
- The critical endpoint of concern for human health is neurobehavioral effects
- Endocrine disruptors



Behavior of PBDEs in the Environment

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- ❑ Not chemically bound to plastics, foam, fabrics
→ more likely to leach out
- ❑ Released from indoor consumer and office products
- ❑ Attach to dust particles
- ❑ Delivered to the sanitary sewer through washing machine rinse water during the washing of fabrics with the attached PBDE-enriched dust
- ❑ PBDEs deposited on land will be mobilized during storm events and delivered to surface waters



PBDE Phase Outs

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- Manufacturers of Penta and Octa voluntarily ceased production beginning in 2004
- Deca manufacturers have agreed to discontinue the manufacture, import, and sales of Deca at the end of 2012
- In Washington State, Deca has been banned from mattresses since 2008
 - Exemption for transportation equipment (exemption includes aerospace industry)
- Deca was banned from televisions, computers, and residential upholstered furniture beginning January 1, 2011

PBDEs & Wastewater Treatment:

Removal Efficiency

- 70% median removal efficiency in primary treatment
- >90% median removal efficiency in lagoon, secondary treatment, and advanced treatment
- Advanced treatment achieves PBDE removal ~96%
- WWTP performance is affected by seasonal variations, presence of algae, and quality of system maintenance
- Highest removal- longer retention time and higher MLSS in advanced treatment
 - *Kim, et al. Water Research (2013)*

PBDEs & Wastewater Workgroup

Recommendations

- Reduce suspended solids
- Higher sludge age = greater PBDE removal
- Optimize existing technologies
- Improve contact time between liquids and solids
- Encourage advanced treatment → low TSS
- PBDEs concentrate in sewage sludge (biosolids)
- Educate the public about PBDE sources and pathways → reduce loading
- New replacements for PBDEs are also potentially hazardous
- Source control – reduce/eliminate
- Green stormwater infrastructure → reduce PBDEs in CSOs
- Proper plant management- reduce pass through and upset

Wastewater Workgroup

Recommendations Re: **Monitoring**

- Consider alternative brominated and non-brominated flame retardants
- Be as inclusive as possible in terms of the PBDE congener list examined via monitoring
- Review monitoring data on the release of suspended solids from WWTPs
- Monitoring schemes could include flame retardant concentrations in WWTP sewage sludges

Goals for this Workgroup

□ Potential Goals

▣ Monitor status & trends of PBDEs?

- ▣ Are we seeing a decline in PBDEs since the ban?

▣ Fate & Transport?

▣ Data to feed models?

▣ What would success look like?